

ROAD MAINTENANCE DELIVERY IN AUSTRALASIA: PROGRESS AND CHALLENGES AFTER A DECADE OF CHANGE

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ABSTRACT

This paper presents a summary of developments in road maintenance delivery models over the past decade in Australia and New Zealand, and offers lessons for their wider application. Over the last ten years, state or national road authorities have tended to award fewer, but larger, contracts covering greater areas of the urban and rural road network. The smaller local government authorities have tended to use more traditional models. There have been some notable exceptions, however, and this has led to the development and implementation of a number of innovative delivery partnerships.

Whilst a small number of large contractors initially had a greater influence, the general nature of long-term contracts has commenced to change. Amongst the key drivers is the need for longer-term strategic management of the network covering all facets of investment and performance, where the network owner retains substantial responsibility working in partnership with network managers and service providers. This has led to the introduction of more collaborative models where road authority and private sector personnel work together in an integrated approach.

1. INTRODUCTION

Over the past 15 years there has been considerable change to the way road maintenance has been managed by road authorities. Efficient use of a diminishing share of public funds is a major concern. The importance of addressing road maintenance properly is well understood and is illustrated by the consequence of neglect. The cost of reconstruction can be between three and four times the cost of the preventative maintenance that should have been undertaken earlier. The effect on road users is also significant, with vehicle operating costs increasing by similar or greater amounts [1].

Robinson [2] reported on the growth of outsourced road maintenance by contract as a response to government economic reforms in the Australia and New Zealand road sectors of the early 1990s which highlighted the need to achieve a more competitive environment for the provision of public services. This resulted in greatly increased competitive tendering of road maintenance and greater involvement of the private sector. Within the Australian State Road Authorities (SRAs) many direct labour organisations or in-house provider units were corporatised or privatised or, as is the case in New Zealand, closed down altogether after being subjected to competition from private contractors. This trend was based upon the perceived economic efficiencies and benefits and improved maintenance standards compared with that achieved by direct labour organisations. Many administrations developed organisational structures where they separated management from operations, i.e. the client / service provider split. The first tranche of these new maintenance delivery models is now reaching completion, with the process still evolving as a response to experience gained and lessons learned.

2. FEATURES OF MAINTENANCE CONTRACT DELIVERY

Since the late 1980s, the execution of maintenance works in Australia and New Zealand has generally shifted from day labour to schedule of rates contracts and lump sum contracts. The definition of works specifications have also changed progressively from an input focus to an outcome focus; i.e. from:

- method specification, i.e. 'you must do it this way' to
- performance specification, i.e. 'you must achieve this result' to

- performance targets, i.e. 'you choose how to achieve at least the desired result whilst meeting a number of levels of service along the way'.

3. ROAD MAINTENANCE BY CONTRACT IN AUSTRALASIA

3.1 General

Australia and New Zealand have been at the forefront of developments in the reformation of road maintenance delivery. They have benefited from almost 20 years experience in organisational change. Robinson [2] reported on developments as recorded at a number of industry workshops. In 2008 a further series of workshops were held around Australia to carry out a review of the current state of practice.

Within Australasia both state and local government road authorities have adopted varying approaches to contracting out their maintenance operations. This extends from traditional day labour, plant hire and schedule of rates which have remained popular particularly with local government authorities through performance based multi year lump sum contracts and whole-of-life design, build and maintain.

Although the desirability of many of the reported benefits of contract maintenance have been appreciated, in overall terms they often did not realise full potential as other factors came into play. Discussions with operators of performance based contracts (both client and service provider) show that the manner and approach taken by both sides must be realistic, achievable and contain a degree of flexibility.

Unrealistic or overly complicated performance specifications or rigidly applied KPIs can also neutralise other benefits associated with performance contracts and create a counterproductive adversarial atmosphere.

The experiences of the various individual states of Australia and New Zealand over the past 10 - 15 years are now presented.

3.2 New South Wales

New South Wales is the most populous state in Australia. The Roads and Traffic Authority NSW (RTA) comprises four regions: the Sydney region covering the greater metropolitan area, the Northern region including Newcastle, the Southern region including Wollongong and the Western region, which is rural. In terms of structure the three regions outside Sydney are more similar to each other than to the Sydney region.

The Sydney region pioneered long term performance specified maintenance contract (PSMC) delivery in Australia. This first long term contract ran from 1995-2005. Following completion, considerable review was carried out to assess the overall achievements of the contract in terms of its original objectives. The main features of the contract comprised:

- 450 km (approximately 1,900 lane km) in Sydney's north-eastern suburbs
- 10 year contract 1995-2005 with asset condition on completion to deliver a 13% improvement above start condition
- warranty on workmanship to extend for a further 10 years to 2015.

The Sydney region contract was extended for three years from October 2005. In mid-2007 the RTA advertised for expressions of interest for a further 10 year PSMC. A new term network contract has recently been tendered and let.

The three regions outside Sydney have a considerable degree of operational autonomy. Since 1995 an increasing variety of maintenance tasks have been contracted out in the search for greater efficiency in maintenance operations. RTA personnel have commented that significant efficiencies have been gained by benchmarking and applying the lessons learned and positive experiences in maintenance contracts and methods developed in the Sydney region to works in the other regions.

The NSW Government's Road Maintenance Reform Package [3] was introduced in July 2000 for the management of road maintenance on State roads. It established a permanent change in the RTA's management of road maintenance, including its relationship with local government. The package introduced single invitation maintenance contracts to create a contractual relationship between the RTA and local council maintenance providers. These contracts with councils continue to work successfully through use of consistent standards, procedures and management systems for worker safety, traffic control and safety, environmental protection and works quality. It sharpened accountabilities by establishing separate roles for RTA Clients acquiring works from (separately managed) RTA in-house, councils and private sector service providers using a contractual relationship.

The RTA has moved towards the use of a performance specified quality assurance contractual relationship which will maximise contractors' freedom to manage resources and maximise efficiency. With analysis at the output level rather than at the input level, so the extent of a contractor's wages, plant, materials; etc costs are a matter for the contractor – not the RTA client.

During 2005-2006 a more collaborative style alliance contract was formed between the RTA directorates for Operations and Services and Road Network Infrastructure [4]. The aim of the alliance, which is a cooperative arrangement for RTA maintenance contracts, is to help drive productivity improvements and cost savings. The alliance has clearly defined processes for decision making with strategies to support regional staff, a review of delivery options and a capability to provide expertise when and where it is needed. Through discussions with local government, the RTA is encouraging 'clustering' of local councils to reduce the number of small contracts. This is expected to produce cost savings through economies of scale [4].

3.3 Northern Territory

The Northern Territory has a population of less than half a million people spread over a large portion of central and northern Australia. The roads division of the Department of Planning and Infrastructure (DPI) was, for many years, regarded as an innovative and progressive organisation for its contract procurement methodology. In recent years it has been overtaken by the majority of other state road authorities with methods such as performance based contracts and medium-long term network contracts [5].

However, the current system of contractual documentation and the method of works packaging is inconsistent between the regions. Recently a form of performance based contracts for line marking, landscaping and rest areas have been tendered out and to this point have been generally successful, with the contractors who are carrying out the work also providing relatively positive feedback.

The current DPI procurement methods include schedule of rates, lump sum, panel contracts and some limited scope performance specified contracts (line marking, roadside vegetation). One advantage of trialling so many variants is that, by default, a reasonable understanding on what procurement methods appear to be more successful than others has been identified.

Contractors have given mixed responses to some of the procurement methods, especially the performance specified contracts. The reasons for this are varied but the main concern was in regards to a higher level of risk transfer taking place. There has been a varied response from a cultural change perspective with the potential changing of procurement methods. Some contractors have even reversed this trend, expressing a willingness to take on more risk if this ensured greater certainty of contracts. A new maintenance delivery model has been described in Barry et al. [5].

A recent development has been the creation, in 2008, of eight new local government council areas encompassing the previously large tracts of unincorporated territory and aboriginal lands. The organisation and execution of road maintenance in these new Councils with a predominantly indigenous population base is the subject of ongoing development with heavy involvement initially at least from the DPI and other Territory Government departments and a phased handover of responsibility.

3.4 Queensland

Queensland is the third most populous state in Australia; it also has the largest proportion of its population living outside of the state capital. While other states and countries have been moving towards open competition as the predominant means of routine maintenance delivery, due to concerns over guaranteeing rural community employment, the Queensland Department of Main Roads (QDMR) (now known as Queensland Department of Transport and Main Roads (QTMR)), has taken a more 'compassionate' stance with an eye also to encouraging good 'stewardship' of the network. The Road Maintenance Performance Contracts (RMPCs) system commenced in 1994-1995. This form of routine maintenance delivery is driven by the need to facilitate 'best value' using a contract system, but which offers some protection to local government work forces.

Contracts are offered as schedule of rates over one or two year terms on a preferred supplier basis to local government and the Department's internal maintenance units [6]. This is based on the belief that local government is well placed to provide best value maintenance due to the economy of scale advantage they hold in maintaining networks of state and local roads. Where local government does not wish to carry out routine maintenance works, this is offered to open competition. RMPCs focus on improving efficiency through a price negotiation process and performance based operating environment. The key features are:

- contractual rather than agency relationship
- payment for work output rather than actual cost (input)
- strong emphasis on planning of maintenance and for efficiency gains
- preferred supplier must demonstrate 'best value' which will be assessed against performance and achievement of productivity, i.e. benchmarking is critical
- partnering approach has been adopted for preferred supplier contracts
- the Department has the role of owner, manager and contract administrator
- contractor to supply regular systematic reporting on inspection works and claims.

Difficulties encountered with the RMPCs have included QA issues, expertise in council work forces, staff changes and particularly culture changes.

However, the RMPC approach has assured QDMR of obtaining 'best value' for its road maintenance dollar. The implementation is regarded as having been successful with the arrangements creating an incentive for work forces to improve. Progress so far has been recorded in innovation, development of a more commercial attitude with enhanced productivity and development of an electronic claims process.

Recent organisational changes with the merger of Queensland Transport with Queensland Department of Main Roads are not expected to have an effect on the administration of road maintenance contracts.

3.5 South Australia

South Australia is the second smallest state in Australia terms of population but it covers a large area of the southern part of Australia. The Department of Transport Energy and Infrastructure (DTEI), the State Road Authority, described how all maintenance in the arterial network in South Australia is subject to competitive tender [7]. DTEI in-house 'Business Units' are also subject to this competitive tender process.

The original 28 contracts have been progressively rationalised and amalgamated since 1998, firstly to 20 contracts then in 2005 to six regional 'five + two' year term contracts. The contract basis is lump sum routine plus schedule of rates but with a surveillance/audit role for DTEI rather than an inspection role. A number of more remote areas were excised from contracts and returned to operation by DTEI's direct labour organisation (DLO) due to difficulties with contract administration.

The longer contract term will allow more scope for amortisation of costs by the contractor and the larger size of the contracts is intended to produce a greater level of competition and consequently greater 'ownership' by the contractors. Periodic works contracts will continue to be let separately.

DTEI does not propose to call 10 year long-term contracts in which a road network is managed totally by a contractor at this time. They have continued to monitor developments in other states and are keen to consider options for more medium-term, smaller-scale performance-based contracts. A number of maintenance contracts have been operating informally on a partnering basis quite successfully and consideration is being given to relationship based alliance-style contracts in the future.

3.6 Tasmania

Tasmania, the smallest state in the Australia and the only island state, has been at the forefront of road maintenance reform in Australia. The Department of Industry Energy and Resources (DIER) is responsible for the road network and has delivered maintenance by formal contract since April 1995 [8]. The first contract was a two year competitively bid contract for maintenance of 350 km of national highway. This contract was awarded to Works Tasmania, the original internal works force, which was subsequently corporatised as Civil Construction Corporation (CCC). In June 1995 a three-year contract was let for the state roads component. This was awarded by direct negotiation with CCC. The contract included standard routine maintenance plus major repairs, resealing, shoulder grading, unsealed pavements, signs and road furniture.

Routine tasks were specified by prescribed intervention level criteria and were bid and paid for by lump sum. Other tasks were performed as schedule of rates and ordered by DIER.

Following experiences with this contract a number of issues that needed to be resolved were identified:

- lack of documented historical condition and cost data
- inadequate inventory
- lack of agreed initial condition, lack of agreement on affordable levels of service
- non competitively bid contract made partnering responses difficult
- difficult to benchmark performance and value
- large variability in scope, asset value and required standard
- expensive contract administration to measure performance on routine portions and works elsewhere for payment
- difficulty in interfacing with other capital works and rehabilitation contracts.

The experiences of the initial contracts were reviewed and the following lessons learned:

- DIER ordering of work was not always the most efficient way for the contract organisation
- use of separate rehabilitation contracts within a one-year period were fundamentally ineffective; the works program should be decoupled from an annual funding cycle
- maintenance was under-managed in the amount of professional oversight and innovation applied to improve effectiveness and efficiency.

A decision was taken to employ a more innovative maintenance delivery regime with the intent of private industry resources playing a larger role in network management. In 1998, the network was divided into three administration and contract areas. The two networks in the north of the state (north-east and north-west) were let as two conventional short-term three-year contracts, whereas the southern part of the state was let as a fully outsourced performance specified contract.

For the two northern contracts, only routine maintenance was performance based and paid as a lump sum. Other work was a schedule of rates bid on assumed quantities and ordered by DIER staff as

required. In the south a ten year long term performance based contract was let to a private consortium. This contract ended in 2008.

There appears to be mixed feelings regarding the success of this long term contract. A number of lessons, particularly with regard to selection and applicability of KPIs, have been learned and these will provide important feedback in preparing for future contracts for which a form of Alliance contract is favoured with greater involvement of DIER.

In 2003 the two northern contracts were merged into a single entity under a four-year contract to a private sector organisation. This contract is a reversion to the more traditional lump sum routine and schedule of rates contract. After a settling in period with some readjustments and personnel changes contractor relations have stabilised.

In October 2006 DIER advertised for expressions of interest for routine maintenance and minor works throughout the State road network in Tasmania, including the National Highway which was previously maintained under two separate contracts covering the southern and north eastern regions of the State. These contracts ended on 30 June 2008. To replace the contracts, DIER let three separate fixed-term contracts, one for each of the north east, north west and southern regions, to cover the three-year period from mid 2008 to mid-2009. These contracts are of the more traditional form and a long term performance based contract will not be employed during the immediate future, although DIER has not discounted use of such a contract form again at some time.

3.7 Victoria

Victoria is located in south-eastern Australia. It is the second most populous Australian state despite being the second smallest in area, similar in size to England and Wales. VicRoads is responsible for maintenance activities on all highways, freeways and some other special classes of roads [9].

The State Government provides VicRoads the funding for the maintenance of the main roads network. Local Government is generally responsible for the delivery of maintenance activities for their networks including the funding. A significant proportion of Councils have, in recent years, handed back the responsibility for delivery of maintenance work on main roads which they had previously carried out on an agency basis for VicRoads. This was due principally to the perceived risk exposure following the introduction of the Road Management Act (Victoria) (10) in 2004 which itself was a direct response to the overturning of nonfeasance immunity, known locally as the 'Highway Rule' in 2001.

Routine maintenance contracts have been competitively tendered since 1995, awarded as a three-year lump sum with provisional quantities (PQ) for patching, surface treatments, emergency works and some other items. Prequalification is essential to eliminate unsuitable tenderers.

The following advantages have been noted:

- the use of PQ items has allowed VicRoads to control the extent of activities within budgetary constraints thus allowing for the setting of priorities for repair work
- a revised VicRoads Standard for Routine Maintenance Delivery was also developed and applied which reduces the Contractor's risk at tender, hence reducing the Lump Sum (LS) price
- partnering, both formal and informal, has worked well in a number of regions. Contracts are currently for periods up to five years (three + two).

However, the following disadvantages have also been recorded:

- Some concern has been expressed over contractors giving preference to provisional quantity items rather than lump sum activities, but given appropriate surveillance this has not been a problem and the development of an improved performance measurement system is seen as desirable.
- Condition state and setting of intervention levels have been rather subjective although regular joint surveys are carried out.

- In some regions highly competitive pricing has not only reduced contractor resources and skill levels but also VicRoads surveillance levels and subsequently quality has tended to come under pressure.

Maintenance works on the roads controlled by VicRoads is delivered in the following way.

- **Routine Maintenance:** All of the work is contracted delivery by contractor or by in-house regional groups operating under a service level agreement with the same requirements as the contract. The contracts are lump sum with a number of provisional items. The service level is defined by intervention levels set for the various activities covered by the contract. Contract durations range from two years to three plus two additional years subject to satisfactory performance.
- **Periodic Maintenance:** All works tendered. Regions are able to negotiate with Sprayline (VicRoads in-house road surfacing provider), for up to 50% of the sealing work. Contracts are usually tendered for a region and cover all of the work required in a financial year.
- **Rehabilitation:** All work tendered with most works by contractor, the remainder being performed by the in-house providers. Contracts awarded for individual projects or groups of projects within a region. The grouping depended on the size and nature of the work.

Regions have a degree of autonomy in administration of maintenance delivery and VicRoads will maintain the status quo whilst continuing to trial minor variations to contract packaging and improve monitoring of performance by contractors and in-house resources.

3.8 Western Australia

Western Australia is the largest state in terms of land area, covering almost one-third of the entire land mass of Australia. Main Roads Department Western Australia (MRWA) is responsible for some 17,000 km of roads across a wide range of climatic zones. Since the mid-1990s, MRWA has undergone considerable restructuring. From originally relying extensively upon the internal labour force for carrying out maintenance operations, there is now a revised strategy involving wholesale contracting out of maintenance operations. The purpose of this was to enable MRWA to focus more strongly on its core business of managing the road network to a standard that meets customer requirements; and to contribute significantly to an annual savings that can be reinvested in the network [11].

Eight Term Network Contracts (TNC's), were let between 1999 and 2000 of which five were fully outcome-based maintenance and rehabilitation contracts. The remaining three contracts were a combination of outcome-based and client scheduled works. All of the contracts were ten years in duration and all will have reached completion by mid-2010.

There were a number of potential benefits identified within the consultation phase of the project including:

- creation of new businesses or expansion of existing businesses
- net gain in employment
- transfer in technology
- training of local people.

A number of issues were raised by both the contractors and MRWA, including definition and measurement of key performance indicators and the general approach to contracts, which are discussed below.

Key performance indicators associated with road condition were specified in terms of rutting, roughness and texture and were expressed in a series of asset condition profiles (ACPs) for each link in a TNC area. These ACPs comprise a cumulative frequency distribution of the condition of the link for each attribute with the individual values which contribute to the profile representing the agreed recording interval for each measure. 'Target' and 'worst' profiles are specified which the contractor must comply with, the former to be achieved at the end of the contract, whereas the latter must not be

exceeded at any point during the contract. ACPs can be generated from road network planning analyses both prior to the commencement of a contract or at any subsequent point, with its shape depending on a number of factors, including initial conditions, projected deterioration under operational conditions and the nature, quality and extent of works performed.

Whilst good in theory, the use of ACPs has, however, received a mixed response from contractors. It was felt that these KPIs had been developed in the early days of contract development with only a limited data set and had some flaws but had still become 'set' for the term of the contract with no scope for a subsequent review. Issues also include how to account for sections which have been subject to capital improvement works and were not accounted in the original contract, and minor improvements such as to intersections and other more limited works which affect condition reporting.

Some of the concerns expressed by contractors on the contracting approach taken by MRWA were:

- each of the contracts are customised and therefore it is difficult to directly compare one area with another
- administration of contracts that cross MRWA regional boundaries required the client's staff to possess detailed knowledge of multiple contracts
- compliance reports may not be appropriate to provide a true on-the-ground impression of the situation regarding the overall performance of the contracts.

One benefit to both MRWA and the contractors is that the level of funding to the TNC areas for maintenance has been reasonably stable for the period of the contracts as MRWA was committed to fixed monthly lump sums for the ten-year periods.

Interestingly, there does not appear to have been any significant numbers of former MRWA engineering and technical staff either transferring to, or applying for, positions within the contracting organisations. Whilst a number of the 'line crews' appear to have transferred, the contractors generally had to rely on their own internal staff when providing management of the operations.

Consultants working in consortia with the contractors were involved within the bidding and operational phases of the projects. The general consensus was that in the overall perspective of bidding and operating such entities it is far more effective if the contractors have sole control over the regions and consultants are brought in as either sub contractors or on an as required basis. This is in part due to the operational structure imposed on the TNC areas as it has the contracts geared towards a contractor perspective.

The contractors and MRWA were new to the environment and many unknowns existed. These unknowns ranged from the ability of the contractors to perform to their contractual requirements through to the contractual administration levels that were required by MRWA.

Overall the TNC's have been acknowledged by both sides as achieving a reasonable level of success. However, as a number of the contracts progressed, issues arose which put the contractors under considerable business pressure in meeting client requirements. As a result, a number of contracts were renegotiated and finally delivered under alliance-style arrangements where the greater involvement of a client's representative exists in determining actions on the network.

Subsequently, all parties have progressively converged on a similar view that the next generation of contracts would be more effective if both parties were working as a team, thus reducing the risk of costly adversarial situations which can occur. Both groups indicated that the approach that is believed would deliver this more effectively is through some form of 'alliance' between MRWA and the contractor.

Consequently, commencing from July 2009 a new set of Integrated Service Arrangement Contracts (ISAs) are being implemented to replace the TNCs [12]. These are much more relational based contracts with the road authority and contractors working collaboratively. They are similar to the TNCs in that they have a strong focus on governance and value for money and have an outcome focused performance specified approach. The funding requirements are based on meeting required levels of service and ongoing assessment of the road network.

The key attributes of the ISA model include:

- mutually aligned goals and objectives
- trust and strong relationships driving performance
- shared responsibility
- commercial framework with incentives to achieve project objectives
- equitable sharing of risk and opportunity
- agreed risk reward mechanism.

Amongst the motives for the change from a MRWA perspective has been the need to achieve greater control of decisions and therefore outcomes on the network. To improve future management, MRWA has established a Directorate of Operational Asset Management which is responsible for a coordinated approach to managing the network, including providing a centre of expertise to guide the regional based teams who are responsible for medium term, tactical planning, procurement and supervision of the delivery of maintenance services through the new ISAs. MRWA previously retained this role in only two of its ten regions, and is working towards a situation which will ensure a more effective involvement in the long term management of the network.

3.9 New Zealand

New Zealand has been at the leading edge of road maintenance reform driven by the need to reduce costs and improve efficiency in the public service.

The national road agency is the New Zealand Transport Agency (NZTA). The national network is managed through 25 sub-networks known as Network Management Areas [13]. There are three primary procurement models used to maintain and operate these sub networks:

- 'Conventional' or 'Traditional' contracts: these are awarded for varying terms, mostly for five years (3+1+1) and involve a consultant managing various suppliers to deliver physical works on the network, in a similar way to traditional road engineering construction contracts. The yearly extensions are subject to an assessment of the quality of service provided.
- Hybrid contracts: these are awarded for five years (3+1+1) and involve both a consultant and contractor working in a partnering arrangement to deliver services on the sub network.
- Performance specified maintenance contracts (PSMC): these are awarded for ten years to one supplier who is responsible for all service provision on the sub network. Four sub-networks are currently managed under this model, including one in the Bay of Plenty region of the North Island which combines both national and local authority roads in the one contract [13].

A number of lessons were learnt from problems that arose, such as:

- good records of inventory and condition data imperative
- high speed data collection – repeatability and reliability still an issue
- robustness of performance measures – are they driving the right behaviour
- success very dependant upon people/relationships/goodwill
- pavement deterioration modelling has some way to go before outputs can be relied upon
- smaller suppliers/social cost associated with longer term, bigger contracts
- must have the right resources
- heavy reliance on self monitoring could be a potential risk.

The following benefits were identified:

- efficiency
- innovation potential maximised

- transparency
- contestability
- ownership returns – our patch
- quality
- price certainty given lump sum contract form
- cost savings over traditional model: 25%.

As a consequence of the lessons learnt, the NZTA set out to develop a long term procurement strategy (LTPS) for the road maintenance industry such that classes of contractor capability could participate at the appropriate level whilst maintaining efficiencies. The LTPS was justified on the basis that long term PSMC trials were very successful, and provided:

- a mix of models covering PSMC, Hybrid and Traditional, noting that selection should be based on what is best for the network and the region
- positions Transit in a strategic role representing the community and government
- allows industry access to Transit's long term plans.

The overall aim is to:

- target a mix of models 1/3-1/3-1/3 (by expenditure) of PSMC, Hybrid and Traditional respectively
- encourage suppliers to take a long term view of their performance
- ensure supplier selection methods keep pace
- allocate risks to the party best able to manage them
- move away from input focused models to an outcome focus.

4. MAINTENANCE ARRANGEMENTS FOR LOCAL GOVERNMENT ROADS

Local Government Road maintenance delivery is carried out by means of a variety of traditional and more innovative models. This is illustrated in the following examples.

4.1 Baw Baw Shire

Baw Baw Shire is a large rural shire located in West Gippsland, Victoria, some 100 km east of the Melbourne metropolitan region. The Shire has a population of 39,000 and a road network of almost 2,200 km, of which almost 1,800 km are the responsibility of the shire Council. Of these roads approximately 50% are sealed and 50% are unsealed. The 400 km of arterial roads are managed by the state road authority, VicRoads.

deBruyne [14] reported that the Council's routine road maintenance works are carried out by a private sector contractor under a nine-year contract (3+3+3 years) based upon ongoing acceptable levels of performance. This is an intervention level based contract with work based upon response to defined defects assessed through a regular inspection regime and stipulating contract response time requirements to repair the defects.

The road inspection schedule includes condition inspections to assess overall condition of the road, compliance inspections to ensure adherence to the intervention standards and an audit process encompassing 10% of the road network per month. Additionally, the overall performance of the contractor is assessed twice a year. A formal partnering arrangement is in place between the council and the contractor with regular meetings ensuring a good communications environment. Customer communications, i.e. with the general public and ratepayers, are shared between the contractor and council personnel.

Partnering initiatives include joint meetings every day for half an hour to discuss day to day issues, the maintenance works program, provisional works, expenditure issues and claims as they arise. A six monthly get together of staff and works crew is also held in a more informal setting where work issues can be discussed.

4.2 Mornington Peninsula Shire Council

Mornington Peninsula Shire is located 70 km south-east of metropolitan Melbourne and covers an area of 720 km². It is home to 133,000 residents. Bounded on three sides by water it has 10% (or 190 km) of Victoria's coastline. Over summer the population rises to about 200,000 and this extra loading puts a lot of pressure on maintenance services. The shire has some 40 towns and villages, each requiring a specific tailored service.

The Mornington Peninsula Shire has now completely reviewed and restructured all the activities [15] that are combined to deliver a comprehensive suite of infrastructure management services, including:

- routine and cyclic maintenance of the local road network, furniture and signs
- buildings
- management of parklands, open space and bushlands
- cleansing and waste collection, recycling and landfill management services.

There are nine long term service contracts that cover this spectrum and all are backed with a Quality Relationship Agreement and annual appraisal and performance review process.

The features of the service specifications are that they are based on a comprehensive program of community consultation which included a process of service standard comparison and preference identification and on a commitment to ongoing contractor/client annual performance appraisal and review. This process relates back to a cyclic program of community forums at which feedback on the standards themselves and the organisation's performance against these standards is sought.

The contracts have been developed with capacity to accommodate growth, external consumer price index (CPI) impacts and also changing community scoping and intervention expectations. The annual appraisal process ends with a report to council recommending contract term extension and any conditions that may be attached to this.

The 15 year term local road network management contract was the first of its kind in Australia for a local authority and was developed and implemented on the basis of a preferred partner approach where the specification and outcome requirements were developed in partnership with the preferred tenderer and then bid.

5. SUMMARY AND CONCLUSIONS

Australasian road authorities have used a number of models in involving the private sector. Lessons are still emerging, and the following observations have been made and conclusions drawn based on experience so far.

1. Approaches to road maintenance depend upon the size of the network, geographical location and financial and human resources. The delivery of works ranges from traditional day labour to fully outsourced performance-based lump sum contracts. Contract terms can be conducted over periods from one to three years or up to ten years or more.
2. The most successful organisations employ a variety of organisational models, this providing value for money by fostering competition, business performance and maintaining client knowledge with significant cost savings and greater efficiency of business units being reported.
3. State or national road authorities have tended to award fewer, but larger, contracts covering greater areas of the urban and rural road network. The smaller local government authorities have tended to use more traditional models. There have been some notable exceptions,

however, and this has led to the development and implementation of a number of innovative delivery partnerships.

4. Whilst a small number of large contractors have had a greater influence, the general nature of long-term contracts has commenced to change. Amongst the key drivers is the need for longer term strategic management of the network covering all facets of investment and performance, where the network owner retains substantial responsibility working in partnership with network managers and service providers. This has led to the introduction of more collaborative models where road authority and private sector personnel work together in an integrated alliance-style approach.
5. A number of consulting organisations have become involved in the management of road maintenance contract as either project or contract managers, on behalf of the client, or in joint venture with the service deliverer. Many consultancies have recruited ex RA personnel as a result of state government reforms and downsizing, taking advantage of this area of expertise in new market opportunities. Some consultancies have been taken into ownership by the larger private sector maintenance organisations. The provision of professional services for road maintenance management in this way has evolved progressively in Australasia over the past 15 years, and has established a substantial cadre of expertise.
6. Whilst the contracting industry has traditionally concentrated upon major construction works, recent involvement in maintenance has been seen as an add-on function rather than a major sector. However, the reforms of the late 1990s have had a significant impact. Corporatisation of former internal works organisations has introduced a new level of professionalism and competition. Contractors have had to face this challenge and learn new skills, often by taking on former road authority personnel.
7. Amongst the major innovations which have evolved over the last two decades and delivered significant community and client benefits are:
 - multi-year maintenance and rehabilitation works programming and associated contract arrangements, including greater security of funding
 - specified minimum road performance standards taking a 'duty of care' approach to managing risks to road users
 - practical partnerships, and alliance-style contracts involving all parties with independent oversight, and increasing community involvement in setting performance targets, this being key to managing the balance between funding availability and level of service expectations
8. Key lessons learned include:
 - well founded data driven historical performance evidence is fundamental to the fulfilment of long term performance goals, and to the effective transfer of risk between parties and to the selection of appropriate contract terms for particular works types
 - best practice in maintenance treatment selection needs to form a key part of contract requirements, including provisional quantities, and be enforceable through the contract
 - owner/client organisations must retain significant capability and be in a position to enforce obligations through effective oversight and surveillance, noting that their roles and required skills will have changed but must still retain intimate knowledge of the network

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